Preface

The author of *Bridge Design Manual* is the Methods Section of the Office of Bridges and Structures.

When complete, *Bridge Design Manual* will replace the policies of the latest hard-copy editions of "Aesthetic Bridge Design Guidelines", "Criteria for Falsework Check", and similar documents. Where production of the manual indicates gaps in existing office policies the manual will include sections for new policies.

Dual unit systems are used throughout the manual, with the exception of the LRFD geotechnical resistance charts [BDM 6.2.7]. Customary U.S. or English unit values are given first, followed by SI or metric unit values in parenthesis.

Bridge Design Manual shall be used with other Iowa DOT documents and standards including the latest editions of the Office of Bridges and Structures "Standard Sheets," the Office of Materials "Instructional Memoranda," and *Standard Specifications for Highway and Bridge Construction*. It also shall be used with the 2010~~2007~~ edition of *AASHTO LRFD Bridge Design Specifications* with the latest interims, except as noted, and the 2002 edition of the *AASHTO Standard Specifications for Highway Bridges* with current errata changes. A list of reference documents and standards along with abbreviations is given in the introduction. An additional list is given with each major article or section.

Office of Bridges and Structures documents are available on the office web site:

http://www.iowadot.gov/bridge/index.htm

and Iowa DOT documents are available in the Electronic Reference Library:

http://www.iowadot.gov/erl/index.html

There have been changes in the organization and numbering of the 2009 edition of the *Standard Specifications for Highway and Bridge Construction.* All references to the standard specifications have been checked and updated if the numbering of the 2009 article is different from the numbering of the 2001 article.

At this time the office no longer is maintaining the allowable stress design/load factor design (ASD/LFD) manual or the metric standard sheets. Until they are updated for LRFD, three~~four~~ sections of the ASD/LFD manual are included with the LRFD manual.

- 5.3 Haunches
- ~~6.3 Drilled Shafts~~
- 8.0 Culverts
- 10.2 Sign Supports

~~The office began the transition to load and resistance factor design (LRFD) in 2005 based on the *AASHTO LRFD Bridge Design Specifications, Third Edition*. To date the office has issued new LRFD superstructure sections for the manual during 2007 and new LRFD substructure sections during 2008.~~

The present bridge and culvert design policy is as follows [FHWA Memorandum and Attachment].

- All bridge projects started after 1 October 2007 shall have the superstructures designed using the AASHTO LRFD Specifications~~, 4th Edition/2007~~.
- With the release of Section 6.6, Piers, of *Bridge Design Manual* the substructure units of bridge projects started after 1 January 2009 shall be designed using the AASHTO LRFD Specifications.
    - The superstructure and substructure for the current J Standards (three-span continuous concrete slab standards) are designed for LRFD and conform to this policy.

  - The superstructure and substructure for the H Standards (three span prestressed beam standards) are ~~being re~~designed for LRFD and conform to this policy. ~~The office plans to finish releasing the updated standards in 2010.~~
  - The RS Standards (three span rolled steel beam standards) are ~~based on the AASHTO Standard Specifications have been withdrawn, re~~designed for~~according to the AASHTO~~ LRFD ~~Specifications,~~ and conform to this policy~~reissued~~.
- Exceptions to this LRFD policy will be considered based on development issues associated with the overall project. In general, if preliminary design (completion of the TS&L) was completed prior to October 2007, the AASHTO Standard Specifications may be used in final design.
- Section 5.3 Haunches generally is not affected by the change from ASD/LFD to LRFD.
- Pile lengths should be designed by the AASHTO LRFD Specifications using the charts in 6.2, Piles, in *Bridge Design Manual* [BDM 6.2.7].
- ~~Section 6.3, Drilled Shafts, of *Bridge Design Manual* has not been updated to LRFD, and thus drilled shafts should be designed by the AASHTO Standard Specifications until a section updated to LRFD is issued.~~
- Reinforced concrete box culverts and flumes will continue to be designed by the AASHTO Standard Specifications until the culvert and flume standards are updated to LRFD on completion of two current redesign projects.
- Repairs shall continue to follow guidelines in the repair section.
- Section 10.2 Sign Supports, which is based on AASHTO's *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, Fifth Edition*, remains allowable stress design to match the AASHTO standard.

The office has modified long-standing practice to increase design strength for Class C concrete from f'_c = 3500 psi to f'_c = 4.0 ksi.

In general *Bridge Design Manual* is intended to define office practice for typical Iowa bridges without restricting innovation for unusual site and design conditions. The words "shall", "required", "office policy", and similar terms indicate mandatory specifications that need to be followed unless exceptions are approved by the supervising Section Leader. Other terms such as "should", "prefer", and "recommended" indicate general guidance subject to engineering judgment of the designer. Interpretations of the supervising Section Leader, the Chief Structural Engineer, the Assistant Bridge Engineer, and the Bridge Engineer supersede policies in this manual.

This manual will be supplemented with memos that update policies. The memos will be issued at the beginning of each month through the "Graphicmail" service. Once issued, the memos will be available on the office web site, along with all of the archived Methods Memos issued from 2001 through 2009. The user should be careful when reviewing the Methods Memos because some are obsolete, and some include policies that have been partially revised and/or references that have been updated.
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Revision dates will be given on the footer for each section or article. While the manual is in production there are no plans to issue paper copies or specific editions.

Standard CADD notes are provided in Section 11 at the end of the manual.

Bridge Design Manual does not include design procedures, examples, or software. For office use, separate documents and access systems will be developed as design aids.

Users are invited to bring errors and omissions to the attention of the Methods Section of the Office of Bridges and Structures.

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